CLAIMS

What is claimed is:

1. A device for creating hydrodynamic cavitation in fluids comprising:

a chamber formed by at least one wall,

the wall having a first orifice configured to permit the introduction of a first liquid stream into the chamber and an opposing second orifice configured to permit the introduction of a second liquid stream into the chamber, wherein the first orifice has a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream.

2. The device of claim 1, wherein the diameter of the first orifice is at least 10% smaller than the diameter of the second orifice.

3. The device of claim 1, further comprising a second pair of opposing orifices disposed in the wall such that the second pair of opposing orifices are in fluid communication with the chamber.

4. The device of claim 2, wherein the second pair of opposing orifices share the same centerline.

5. The device of claim 2, wherein the second pair of opposing orifices have different sized diameters.

6. A device for creating hydrodynamic cavitation in fluids comprising:

a housing having at least one wall defining an interior,

the wall having a first orifice configured to permit the introduction of a first liquid stream into the interior and an opposing second orifice configured to permit the introduction of a second liquid stream into the interior, wherein the first orifice and second orifice generally share the

same center-line and the first orifice has a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream.

7. A device for creating hydrodynamic cavitation in fluids comprising:
a flow-through channel having at least one wall,
the wall having a first orifice that is in communication
with the flow-through channel for introducing a first liquid stream into the flow-through channel,

the wall having a second orifice opposite the first orifice that is in communication with the flow-through channel for introducing a second liquid stream into the flow-through channel,

wherein the first orifice and second orifice share the same center-line and the first orifice has a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream.

8. The device of claim 7, wherein introduction of the first liquid stream through the first orifice creates a first liquid jet and introduction of the second liquid stream through the second orifice creates a second liquid jet.

9. The device of claim 8, wherein the first liquid jet impinges with the second liquid jet such that the first liquid jet penetrates and interacts with the second liquid jet thereby creating a high intensity shear layer.

10. The device of claim 7, wherein the flow-through channel is configured for passing a hydrodynamic liquid through said flow-through channel.

11. The device of claim 7, wherein the diameter of the first orifice is at least 10% smaller than the diameter of the second orifice.

12. A device for creating hydrodynamic cavitation in fluids comprising:

a flow-through channel for passing a hydrodynamic liquid, the flow-through channel having an outlet;

a cavitation chamber situated within the flow-through channel, the cavitation chamber defined by at least one wall and an exit orifice wherein:

the wall includes a first orifice configured to permit the introduction of a first liquid stream into the chamber and an opposing second orifice configured to permit the introduction of a second liquid stream into the chamber, wherein the first and second orifices are generally aligned with each other and the first orifice has a diameter sufficiently smaller than the second orifice to permit penetration of the first liquid stream into the second liquid stream, and

the exit orifice is in communication with the outlet;

a restriction wall in physical communication with the wall and the flow-through channel to prevent the hydrodynamic liquid from exiting the flow-through channel before entering the first and second orifices.

13. The device of claim 12, further comprising a second cavitation chamber situated within the flow-through channel in series with the first cavitation chamber, the second cavitation chamber having a pair of opposing orifices that are generally aligned with each other and have different diameters.

14. The device of claim 12, wherein the wall includes a second pair of opposing orifices that are generally aligned with each other and have different diameters.

15. A method of creating hydrodynamic cavitation in a chamber defined by at least one wall, the method comprising the steps of:

introducing a first liquid stream through a first orifice in the wall to create a first liquid jet;

introducing a second liquid stream through a second opposing orifice in the wall to create a second liquid jet that interacts with and penetrates the first liquid jet thereby creating a high shear intensity vortex contact layer resulting in hydrodynamic cavitation.

16. The method of claim 15, wherein the relative velocity between the first and second liquid jets is at least 10 meters/second.

17. A method of creating hydrodynamic cavitation in fluids, the method comprising the steps of:

passing a hydrodynamic liquid through a flow-through channel having at least one wall;

introducing a first liquid stream through a first orifice in the wall to create a first liquid jet;

introducing a second liquid stream through a second opposing orifice in the wall to create a second liquid jet that interacts with and penetrates the first liquid jet thereby creating a high shear intensity vortex contact layer; and

creating a high shear intensity vortex contact layer when the first liquid jet interacts with and penetrates the second liquid jet thereby creating hydrodynamic cavitation.

18. The method of claim 17, further comprising the step of creating and collapsing cavitation caverns and bubbles in the high shear intensity vortex contact layer.

19. The method of claim 17, wherein the relative velocity between the first and second liquid jets is at least 10 meters/second.